

Strategy Research Project

A New Paradigm for Achieving the Navy's Budgetary Goals

by

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United States Army War College
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USAWC STRATEGY RESEARCH PROJECT

A NEW PARADIGM FOR ACHIEVING THE NAVY'S BUDGETARY GOALS

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ABSTRACT

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The Department of Defense is facing a severe budget cut and must take decisive action if it is to avoid the hollow force. The Navy's budget must also be reduced but with the added challenge of balancing risk while trying to maintain and deploy a 313 ship force. Only through the adoption of a paradigm shifting budget reduction strategy can the Navy effectively cut its budget by reducing procurement costs through the globalization of shipbuilding, incorporating warship serialized production and stable design to lower operating and maintenance costs, and finally reduce overall manning afloat by incorporating human systems integration engineering up front while designing future ships. When adopting a new strategy, risks must be considered as well as any mitigating options. In summary, the Department of Defense must make serious choices regarding budget reduction strategies. It cannot afford to make piecemeal cuts through cancelling or delaying individual programs. The entire system must be reexamined and a new path taken if real savings are to be achieved in the long run while preserving the commitment to meet America's strategic goals.

A NEW PARADIGM FOR ACHIEVING THE NAVY'S BUDGETARY GOALS

The United States (US), along with many countries around the world, is currently facing difficult economic challenges and decisions in order to maintain continued stability while building future prosperity in an uncertain global economy. At the top of US economic challenges lies the largest federal debt in US history, which is projected to be 16.6 trillion dollars in Fiscal Year (FY) 2012, with an estimated annual deficit of 1.1 trillion dollars for 2012.¹ In response to these looming economic issues, the President presented several priorities for the FY2012 budget in his budget message to Congress. One of the President's priorities is the reduction of the deficit, in part, by limiting discretionary spending.² National Defense spending makes up almost 20 percent of the total US budget and almost half of the discretionary budget.³ To reduce the annual deficit and slow the growth of the overall debt, a key piece of legislature has been enacted to reduce discretionary spending. The Budget Control Act of 2011 reduces Department of Defense (DoD) spending by 465 billion dollars over the next 10 years with another 564 billion in cuts coming with sequestration if it occurs.⁴ In the 10 years since the terrorist attack on the World Trade Center on September 11th, 2001 occurred, the DoD budget has increased by 86 percent and it has more than doubled in size when Overseas Contingency Operation (OCO) funding is taken into account.⁵ The DoD must take action and adhere to these initiatives in order to do its part in combating the long-term threat the federal deficit poses to American security, power, and interests. Each uniformed service must modify the current strategy to make sensible reductions to its portion of the defense budget as a part of the debt reduction solution in order to continue to carry out the National Military Strategy while minimizing economic risk.⁶

The United States Navy, as well as the United States Army and the United States Air Force, share the burden in implementing DoD budget reductions while maintaining the ability to achieve National Defense and Military Strategic goals. To reach these mandated savings, the Navy must formulate a strategy that accounts for challenges in the domestic and global environment. The Navy is a platform-centric service and any strategy adopted as part of cost saving measures must address the platforms the Navy builds and the challenges associated with altering the way it approaches the defense industrial base. As part of the responsibility of formulating a strategy in which to achieve savings, the Navy must also make informed decisions regarding where it should accept or manage risk. In the latest Quadrennial Defense Review (QDR) released in February 2010, the DoD lays out a defense risk management framework composed of four categories which are used to provide a multidisciplinary approach to assessing risk.⁷ This paper will focus on one revolutionary and far-reaching potential cost saving strategy concerning shipbuilding, the challenges associated with implementing this strategy, and an analysis of risks associated with this strategy as outlined in the QDR.

The Navy, along with the other services, organizes the budget in accordance with a standard set of appropriations. One appropriation title, Revolving and Management Funds, is an account established by Congress that permits the uniformed services to work on a more business-like basis through reimbursable amounts received from other agencies.⁸ As it is a revolving account, it is not considered one of the six main appropriations budgeted by the services, and therefore, will not be examined in this paper. The categories of the appropriations and the Fiscal Year 2012 base budget request for the Navy are presented in Figure 1 below. The base budget is used, instead

of total funding, since OCO funds will be largely eliminated once the drawdown from Iraq and Afghanistan is complete.

Department of the Navy	FY 2011 Continuing Resolution	FY 2012 Request	Delta '11-'12
<i>\$ in Thousands</i>			
Military Personnel	43,969,356	46,644,817	2,675,461
Operation and Maintenance	41,983,390	47,228,370	5,244,980
Procurement	43,426,250	45,321,437	1,895,187
RDT&E	19,908,486	17,956,431	-1,952,055
Military Construction	4,178,555	2,643,026	-1,535,529
Family Housing	515,109	468,835	-46,274
Revolving and Management Funds	1,667,945	1,126,384	-541,561
Total Department of the Navy	155,649,091	161,389,300	5,740,209

Figure 1 – Dept of the Navy Base Budget by Appropriation Title⁹

The three largest cost drivers, which make up 86 percent of the total Department of the Navy (DoN) budget, are shown in Figure 1 to be Military Personnel, Operations and Maintenance, and Procurement. For comparison, the remaining items: Research, Development, Testing and Evaluation (RDT & E) make up 11 percent, Military Construction at 2 percent, and Family Housing at 0.3 percent of the total budget. As mentioned previously, the Navy is a platform-centric organization and any cost saving strategy should directly involve one or both of the two primary types of platforms – aircraft and ships. This paper will focus on the afloat platform vice the aircraft platform as potential areas for the adoption of cost reduction strategies as the cost of afloat units, the lifecycle costs, and the number of military personnel used to operate warships is significantly larger than that of the aircraft platform.

The proposed strategy for achieving savings with the ship platform is difficult to implement due to the radical departure from the historical methods used to procure and construct warships, however, the long term savings to the budget will allow the Navy to remain prepared for future conflicts. Quite simply, the Navy must adopt a paradigm

shifting strategy in which ships are procured more inexpensively; require lower operation and maintenance costs; and finally, are manned by fewer personnel in order to achieve an overall long-term savings. Several significant challenges must first be overcome while mitigating any risks that may be identified with the adoption of this strategy.

The first and greatest challenge when examining the element of lowering the cost of ship procurement is shifting the paradigm from the idea that the US national industrial base of shipbuilding must be protected (by solely building ships in the continental US) to a more globalized view. The shipyard facilities that currently make up the national defense shipbuilding industrial base consist of first tier and second tier shipyards which produce six functional products including: aircraft carriers, amphibious ships, sealift, surface combatants (cruisers, destroyers, and littoral combat ships), research/special vessels, and submarines. Another segment, major ship subsystem providers, can also be categorized into functional products including: system integrator, mission system integrator, armament, mission systems, propulsion or main engine, and yard/builder providers.¹⁰

Eight US shipyards comprised of six first tier (large capacity) shipyards and two second tier (smaller capacity) shipyards, split amongst four overall parent companies, build the majority of Navy ships. The first tier shipyards include Newport News, Avondale, and Ingalls, formerly owned by Northrop Grumman Shipbuilding (NGSB) and are currently owned by Huntington Ingalls Industries (HII). Rounding out the list of tier one shipyards are Electric Boat, Bath Iron Works, and National Steel and Shipbuilding Company (NASSCO), which are owned by General Dynamics (GD). The second tier

shipyards are both manufacturers of the two styles of littoral combat ship: Austal USA, whose parent corporation is located in Australia and Marinette Marine Corporation (MMC), whose parent corporation is located in Italy.¹¹

The national shipbuilding industrial base, a relic established to support World War One, World War Two, and large Cold War era fleets, has been eroding for the past several decades due to shrinking demand. The industrial base must evolve to match the global composition of today's modern corporations.¹² NGSB made the business decision in March 2010 to sell HII its shipbuilding divisions, which comprised approximately 20 percent of Northrop Grumman defense revenue. NGSB made the decision based on decreased and unpredictable demand from the Navy that created low profitability and a lack of synergy with its other businesses.¹³ Since acquiring the shipyards, HII has already decided to close the Avondale shipyard, located in Louisiana, after the completion of the remaining two LPD-17 series of Navy amphibious assault ships have finished construction in 2013. By consolidating operations to Pascagoula, MS the company has promised the Navy savings of \$600 million from 2013 to 2019.¹⁴

As a comparison, the defense aerospace industry is viable because it has a robust commercial sector which offsets to some degree any decline or variance in defense plane manufacturing.¹⁵ Conversely, out of the six tier one shipyards, only NASSCO has competed in the US commercial shipbuilding industry utilizing its ability to build cargo and support ships for US Navy and Military Sealift Command (MSC) as synergy for building similar ships for the commercial market.¹⁶ The five remaining large US shipyards function in a failed market whose sole customer is the Navy. Therefore, alternatives need to be addressed if the US is to sustain an experienced workforce.¹⁷

When compared to shipyard facilities in other countries, the US is more costly both in terms of volume as well as efficiency/modernization. The number of Navy ships built each year is low as compared to the number of ships being produced by the leading international shipyards. A low volume of production makes it difficult for US shipyards to match international shipyards improvements in technology and productivity which result from capacity utilization. By manufacturing ships using serial production and a stable design, US shipyards must also increase productivity in order to realize efficiencies which will reduce the cost of shipbuilding for the Navy.¹⁸ Using these concepts, vessels can be produced in South Korea for one third the price of comparable ships in the United States. More specifically, a Korean shipbuilder can produce a ship for the same price that a US shipyard pays for the steel alone, as US labor and manufacturing regulation costs are high. If foreign shipyards have the heavy manufacturing advantage in building ships of low to medium complexity for the bulk transport and cruise industries, then the US must take advantage of these capabilities through globalization to produce similar US military vessels at a much cheaper cost.¹⁹

The biggest challenges to removing protectionist barriers on the shipping industry are legislative. Specifically, two pieces of legislation must be addressed in the form of repeals, waivers, or revisions. The more significant of the two pieces of legislation to affect the US commercial shipbuilding industry is the Merchant Marine Act of 1920, also known as the Jones Act, named after Senator Wesley Jones who sponsored the legislation. Two parts of the Jones Act have significant implications to removing global barriers. The first part is important to the industrial base because it mandates that ships must be solely American built, owned and staffed. One of the ways this piece of

legislation could be altered would be to allow American companies to own or partner with foreign shipbuilder to build the vessels in an overseas location. The second part heavily restricts the use of foreign parts and labor in ship construction as well as repair.²⁰ The second piece of legislation: The Buy American Act of 1933, with certain exceptions, requires materials procured by federal agencies or constructed by private contractors be of US origin and manufacture.²¹ The primary issue with this amendment is the mandate for the use of 100 percent American steel, as this is the largest component in ship construction. However, the 1979 Trade Agreements Act supersedes the Buy American Act on contracts with companies from certain countries as well as certain dollar thresholds except in cases where the US industrial base is concerned. This Act has already been weakened by trade agreements such as the North American Free Trade Agreement (NAFTA) which allowed many jobs and manufactured goods to be moved overseas.²² This outdated protectionism legislation needs to be further waived or amended by Congress to allow the defense industry to enter into a globalized age. The total number of Navy ships being produced has shrunk to such an extent that the shipbuilding industry will have no choice but to close additional facilities as evidenced by the upcoming closure of the Avondale facility.

The two primary concerns promoted by the US Industrial Base are the loss of capacity in terms of the number of physical vessels it can produce if increased output is necessary in a wartime environment as well as the loss of experienced workers who are needed to maintain the specialized skill set. Therefore the notion of surge production capacity or capability being negatively affected is not a true statement as the complexity of modern naval ships does not translate into a World War II style mobilization model.

While ownership of shipyards has changed and been consolidated, the total number of shipyards that were producing vessels to meet the Regan-era goal of a 600 ship Navy has not been consolidated. This has created a conglomerate-style defense industry in which these large diversified firms have no incentive to cut assets. By having a small number of corporations hold a large number of contracts, these companies have reduced risk and stabilized earnings. Excess capability can now provide valuable options for future business given the cyclical nature of defense funding strategies. The industry must have incentives to consolidate shipyards to reduce redundant infrastructure which will rid itself of excess capacity.²³ Absent of competition, US shipyards have become inefficient and outdated, instead, depending on the Buy American Act legislation mentioned above. As a result, ships are constructed virtually the same way as they were sixty years ago. Based on analysis completed in 2005, US shipyards remain fifteen years behind foreign shipyards in terms of modernization, efficiency, and productivity.²⁴ By maintaining the current industrial base, the shipbuilding industry could build the next thirty years worth of requirements five times over which is far more surge capability than needed and does not translate into savings for the Navy.²⁵ Decreasing the number of shipyards can create efficiencies in production which then leads to modernization of the facilities generating further cost savings.

The second primary concern the national industrial base promotes is the loss of capability represented by experienced workers needed to maintain the specialized skill set of constructing complex naval vessels. The reduction in ship production cannot support the specialized industry of shipbuilding in its current state, and steps need to be taken to prevent the loss of an experienced worker base. For shipyards to reach

profitability and maintain reasonable wages to retain skilled workers, the industry must consolidate to achieve greater economies of scale that result from industry concentration, as well as adopt improved workforce practices. Consolidation will lead to job loss in some areas; however, this remains consistent with changes experienced throughout other industries in the US as a result of globalization. The aircraft and automobile industries are as examples of this type of change which ultimately resulted in better products and increased pay for the workers.²⁶ As industry becomes leaner and adjusts its manufacturing processes to gain efficiencies, so too must the workforce organizations. Reports for the shipbuilding workforce indicate that industry practices have led to an over-specialization of the workers which aids in creating shipyard inefficiencies.²⁷ Narrowly defined job classifications based on union rules and worker certification requirements reduce flexibility and lead to inefficiency as workers sit idle at the shipyard. General Dynamics, at their Electric Boat shipyard in Quonsett Point in Rhode Island, provides an excellent example where a lack of unions and the ability to cross train personnel has increased production of submarines at the facility. As shipyards consolidate, the need to cross train for flexibility will increase, thus providing more stimulating work while increasing wages to retain qualified, experienced employees.²⁸

Once the above challenges and concerns have been addressed, logical steps can then be followed through partnering with or purchasing an overseas shipyard. US shipyards can then copy best practices, consolidating, and modernizing domestic shipyards to achieve further cost savings.

The first step would be to begin with a smaller, simple platform on a limited production scale initially, to provide a lower cost option to start while working out the nuances of a new venture. Foreign shipyards can build and deliver the US low-technology, non-weaponized platforms such as logistic supply ships and amphibious transports without the US being afraid it would lose any type of technological military edge.

The next step in the process would be to design a cruiser (CG) or destroyer (DDG) based on a modular design separating the hull from the high-tech combat and mission systems, similar to the concept of the new littoral combat ship's (LCS) mission modules. By designing a generic hull, it would allow the Navy to build a multi-mission hull which could be specialized based on need by swapping modules. This de-coupling of hull and system would have the additional advantage of separating export sensitive technology, possibly making foreign sales to other nations potentially more attractive. This ship could be designed more along the lines of the Joint Strike Fighter (JSF) where many nations pool their resources but have different technologies installed depending on their needs. Adopting a modular concept also isolates changes in technology development within the mission modules allowing for cheaper, easier method of upgrading systems. Separating these items would improve the Navy's ability to manage requirements mission creep often associated with new procurements.²⁹

Once the combat vessel has been designed with a modular concept, step three would be the actual construction of the hull at an overseas facility with the exception of the installation of high-tech systems, which would be installed at domestic facilities. Two options for overseas production become readily apparent: a more costly (though

cheaper than US produced vessels) and lower risk approach or a less costly, potentially higher risk approach. The first option reduces risk by utilizing nearby or closely allied nations such as Canada or another NAFTA country. This would enhance the greater North American defense industrial base as a whole, allowing the US to conserve resource dollars while improving innovation, coordination, and reducing excess capacity with other countries.³⁰ The second option, though riskier, would yield even greater cost savings. As mentioned previously, South Korea can build ships for less than the US pays to procure the steel. To give an oversimplified example, the cost of a US produced warship without its combat system is \$200 million. High-tech combat and mission systems roughly account for one third total ship cost, adding \$100 million to the cost for a total of \$300 million. A South Korean shipyard could build the warship hull without the modular combat system for \$67 million. The hull can then be steamed back the US and then the domestically built high-tech system could be installed by the US shipyard acting as a systems integrator for a total cost of \$167 million. This globally produced warship would cost just 56 percent of what a domestically produced warship would cost.³¹

The fourth step after the production of the hull, as detailed in the above example, would entail the procurement of the high-tech combat and mission systems from a domestic supplier in the defense industrial base who would integrate the hull and system at a domestic shipyard. Even if the expense for modularizing and integrating the combat system result in additional costs, there is still plenty of savings to be realized even in the face of possible unknown requirements growth.³²

The next strategy of reducing operating and maintenance costs can be realized in conjunction with the above paradigm shifting strategy of producing a globalized

combat platform. Concurrently as part of step two, during the hull/combat systems redesign phase, if done correctly, warships can be designed to take advantage of advancing technologies and practices to reduce operating and maintenance costs. Redesigning ships with a common base platform and more modular approach will allow for larger quantities of scale achieved through serial production. Innovations in design and construction would aid in reducing total lifecycle costs. Also, more commonality across systems and parts would be produced, along with modularity would ease obsolescence issues and also play a large role in reducing lifecycle costs. Further reductions can be achieved if elements from commercial shipping vessels form the basis for the hull as it will broaden the demand for parts.³³

Three US Navy shipbuilding programs have shown how effective serial production and stable design are reducing the costs of shipbuilding along with operating and maintenance costs. These examples are the Virginia Class Attack Submarine (SSN-774), the Lewis and Clarke Auxiliary Class (T-AKE-1), and the Arleigh Burke Class Destroyer (DDG-51). Serial production allowed lessons learned from one ship to be transferred to the next, which significantly lowered the man-hours required to build follow on ships in the class. Using a stable design allows a shipyard to optimize facilities and planning because the stable design eliminates the risk of having to constantly incorporate changes. As mentioned previously, stable designs allow for commonality of parts which greatly affect lifecycle costs.³⁴ These longer production runs also mean there is less of an obsolescence issue to worry about as the platform matures. Conversely, the LCS can be seen as a prime example of failure in terms of serial production and stable design. Two different ships manufactured by competing shipyards

were prototyped to foster competition between the companies. The company whose design best met the performance based criteria was to be selected by the Navy to produce 55 ships in the class. Instead, both designs were accepted for production. Mission creep and other design changes led to severe cost overruns, and currently only 10 of each ship will be produced. Contributing further to this problem, neither ship shares many of the same common components (for example one uses Rolls-Royce engines and the other General Electric engines).³⁵ The problems found in the LCS could have been avoided if the program had adopted the practices of serial design and stable production to assist in keeping production and lifecycle costs affordable. Globally produced warships will need to follow this strategy to keep operations and maintenance costs under control.

Finally, the last strategy for reducing the Navy's shipbuilding costs can be found in the reduction of personnel. A reduction in personnel manning ships drives down overall military personnel costs and can be achieved through the redesign of future ships which generates synergy with the previously discussed strategies. This is not "minimal manning" but "optimal manning" which has not been implemented by the Navy correctly.³⁶ The GAO published a report in June 2010 which recommended the Navy reevaluate workload requirements on surface ships to develop an analytical basis for making personnel reductions afloat. The basic premise of the report stated the Navy reduced manning by increasing the workweek to 70 hours and discounting the work done while in port compared to work done at sea.³⁷ Incorporating modern systems and designing ergonomics prior to ship construction is fundamental to total ownership cost and greatly affects personnel costs throughout the life of the ship. This is called human

systems integration (HSI) and by incorporating it at the initial design phase before a ship is constructed will help make optimal manning a reality. Currently engineers and acquisition managers do not consider human performance and costs during the design and engineering phase. Focus, instead has primarily been on the technologies, systems, hardware, and software needed for peacetime and combat operations. An example where manpower, personnel, training, and human systems integration have not been considered in design is with the Oliver Hazard Perry Class Frigate (FFG-7). The initial ships were designed to be minimally manned with 185 personnel, but because an assessment of crew size to systems and real world operations was not conducted, the FFG-7 class ship crew size increased by 20 percent. Existing ships that reduce personnel are minimally manned, not optimally manned as their systems were not designed from the ground up to support a lower number of personnel onboard.³⁸ The report issued by the Naval Research Advisory Committee in 2000 still holds true today, "Human Engineering--the hard quantitative science of incorporating data on human capabilities and limitations throughout the design process--is essential."³⁹ As the GAO report issued 10 years later shows, this strategy still needs greater attention if true personnel cost savings are to be achieved across total ownership cost of a platform.

Before any strategy can be adopted, a risk assessment should be performed to see where the dangers lie and address how those risks might be mitigated. The 2010 QDR lays out a risk framework using four categories, operational risk, force management risk, institutional risk, and future challenges risk. This framework can be applied to the budget reduction strategy of reducing procurement costs through globalization of shipbuilding, reducing operating and maintenance costs through

warship serialized production and stable design, and reducing overall manning by incorporating human systems integration engineering up front while designing future ships with lower crews in mind.

The first category, operational risk, is “the ability of the current force to execute strategy successfully within acceptable human, material, financial and strategic costs.”⁴⁰ Operational risk primarily deals with current operations and plans but it has relevancy to all areas of the proposed budget reduction strategy. The risk associated with globalized ship construction involves the two previously mentioned areas relating to shipyard consolidation and the retention of experienced workers. Risk can be considered high in this area if the world ever conducts another total war. The loss of surge capacity, both in terms of production and human capital, is the primary risk associated with total war. However, given the high-tech nature of today’s and future naval vessels, it would take three to five years to produce a new warship, which means the US will go to war with the force it starts out with.⁴¹ Outside of prolonged total war, there would not be much operational risk associated with globalized production as refit work could still be performed at a domestic shipyard because it will still retain the capability as a systems integrator. Risk associated with losing status with the foreign country which is producing hulls for warships would also be a low risk as it would be mitigated by the growing global interdependence of most nations, especially the greater the number of nations brought onto the project. Even if an adversarial foreign country were to buy copies of the hull, that enemy would not be able to exploit any weaknesses as the Navy’s technological advantage would be built and installed back in the US. Operational risk associated with the strategy of adopting a serial production and stable design would be

low. Designing a revolutionary new platform takes time which greatly affects when the new class of ship can be operational. However, the operational risk here would be low as the rate of true technological innovation is very slow. Personnel manning reduction could be seen both in terms of a high risk and a low risk. It would be high if optimal manning was to be continued incorrectly as per the GAO report, but it would be low if human interface engineering was done up front at the beginning of the design process.⁴²

The second category, force management risk, is the “ability to recruit, retain, train, educate, and equip the All-Volunteer Force, and to sustain its readiness and morale.”⁴³ From a globalized production standpoint, this risk category would be low as cost savings could be realized into other areas of the budget providing more funds to train, educate, and equip. Risk would also be low from a ship design standpoint as ships will incorporate HSI to account for reduced personnel. Risk of mission failure exists under the force management risk category as reductions in personnel aboard ships can have a negative effect on the remaining personnel if a reduced number of people must continue to conduct the same tasks. If ship design were to not properly capture these mission sets under HSI, then risk would be high as it has proven itself to be a problem in the LCS program.⁴⁴ Increased operational tempo (optempo) due to fewer ship assets can lead to a drop in readiness and the personnel operating these ships can develop impaired morale as a result. This risk can be mitigated by increasing fleet size which will reduce optempo. Increase in fleet size can be achieved through adopting cost saving strategies as presented in this paper. This optempo reduction will provide both assets and personnel a chance to reset before the next mission.

Third, institutional risk, is “the capacity of management and business practices to plan for, enable, and support the execution of DoD missions.”⁴⁵ Institutional risk carries the highest risk of all the categories. The toughest challenges to be overcome to mitigate this risk are the entrenched beliefs of the institutions, Congress and the public. The toughest strategy to adopt will be the globalization of ship production. Congress is beholden to its constituents and large businesses that pay for re-election campaigns and therefore there is high risk Congress would have no incentive to move forward with this strategy.⁴⁶ To mitigate this risk and convince Congress and the public to accept a globalized production approach, the shipyards would first need to be consolidated so the potential platform of job loss would not exist. Instead, a platform of job creation could be put forth educating the public about the increase in high-tech combat and mission systems that would be produced as a result of constructing more warships. Also, work opportunities would be increased at the shipyard as more hulls moving through the system ultimately translates to more American jobs. The defense industrial base is concerned about the loss of revenue and the potential ripple effect that this could have on other parts of the defense business, but this would be mitigated by maintaining the technological and integration capabilities in the US. The military culture and institution fears a loss of control and accepting increased risk in safety and combat effectiveness through personnel reductions.

Finally, future challenges risk is “the Department’s capacity to execute future missions successfully, and to hedge against shocks.”⁴⁷ Future challenges risk, is easily mitigated through both globalized construction and ship redesign. A smarter, modular-based design can be easily upgraded to future technological developments which

mitigate risk the Navy would have to execute future missions. By adopting a globalized shipbuilding strategy, the Navy would lessen shocks by allowing multiple foreign shipyards to compete for hull construction. Competition on the global stage would keep costs low and steady vice the monopolistic system present in today's shipbuilding strategy. As previously discussed, keeping fewer domestic shipyards open will assist in the defense industry to maintain both capacity and capability, while ensuring the Navy retains its technological edge by installing classified high-tech systems only at domestic facilities.

In summary, the Department of Defense must make serious choices regarding budget reduction strategies. It cannot afford to make piecemeal cuts through cancelling or delaying individual programs. The entire system must be reexamined and a new path taken if real savings are to be achieved in the long run while preserving the commitment to meet America's strategic goals. Procuring ships from foreign sources requires overcoming large challenges, mostly self imposed by entrenched institutions. However, risks do exist when politics between nations becomes an issue. Redesigning ships to a modular design aids in reducing the challenges and associated risks while producing higher quantities with commonality benefits operational and maintenance budgets. Finally, accepting some risk in the current manning environment by adopting modern practices will bring quick budgetary reductions but will be mitigated in the future through the redesign of future ships to accommodate smaller crews while making the most of new technology. In conclusion, the DoD and the US Navy must find a way to overcome outdated, entrenched philosophies, cultures, and institutions in order to truly be able to meet current and future National goals with reduced budgets.

Endnotes

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